

We claim:

1. A composite waffle stiffener, comprising:

a plurality of composite material plies layered in a waffle configuration, the plies forming a plurality of generally parallel first webs extending in a first direction and a plurality of generally parallel second webs extending in a second direction and intersecting the first webs to form pockets, at least a portion of the plies having cap regions defined by crests of the first and second webs; and

a plurality of first cap strips located between at least two of the plies, each of the first cap strips extending along the cap regions in the first direction.

2. The stiffener of claim 1, further comprising:

a plurality of second cap strips located between at least two of the plies, each of the second cap strips extending along the cap regions in the second direction.

3. The stiffener of claim 1, wherein:

the first and second webs are perpendicular to each other.

4. The stiffener of claim 1, wherein:

the unidirectional cap strips are substantially flat along a length of the cap regions.

5. The stiffener of claim 1, wherein:

each of the plies comprises a strip, the plies being laid side-by-side in the same direction and having overlapping edges.

6. The stiffener of claim 1, wherein:

the plies comprise first and second sheets cut to a predetermined pattern for conforming to a shape of a tool, the sheets having overlapping portions; and wherein the first sheet forms the crests and upper portions of the webs and the second sheet forms a base of each pocket and lower portions of the webs.

7. A composite waffle stiffener, comprising:

a plurality of web plies layered in a waffle configuration, the web forming a plurality of generally parallel first webs extending in a first direction and a plurality of generally parallel second webs extending in a second direction and intersecting the first webs to form pockets, the fabric plies having cap regions defined by crests of the first and second webs;

a plurality of base plies layered in a waffle configuration, the base plies forming the bases between the parallel webs;

a plurality of unidirectional cap plies located between at least two fabric plies and extending along the cap regions in both the first direction and the second direction; and wherein

the unidirectional cap plies are substantially flat along a length of the cap regions.

8. The stiffener of claim 7, wherein:

the web plies and base plies comprise sheets cut to predetermined patterns for conforming to a shape of a tool, the sheets having overlapping portions; and wherein the web sheet forms the crests and upper portions of the webs and the second sheet forms a base of each pocket and lower portions of the webs.

9. A composite stiffener, comprising:

a panel having a plurality of pockets, each of the pockets having a flat base, four sloping sidewalls and four crests orthogonal to each other, the pockets being in uniform parallel rows, defining a waffle configuration;

each of the rows having a first strip of composite material, the first strips being parallel to each other and forming the base, two of the sidewalls and two of the crests of each of the pockets being within each of the rows;

each of the rows having a second strip of composite material, the second strips being parallel to each other and overlapping partially with adjacent first strips to form the other two of the sidewalls and the other two crests of each of the pockets within each of the rows;

each of the rows having a plurality of first cap strips that extend along the two of the crests of the pockets; and

the panel having a plurality of second cap strips that extend parallel to each other and perpendicular to the first strips over the other two crests of each of the pockets.